

What is Claimed is

1. A compact pivoted and counterbalanced table support mechanism providing the user with readily changeable and automatically clamped tabletop heights while maintaining the tabletop level, and counterbalancing the weight of the table and its cargo at a mid range level, while minimizing force applied by the user, when height levels are unclamped, to raise or lower the tabletop through a continuous range of different height levels, comprising:

- a base,
- an elongated column upstanding from the rear of the base,
- a linkage pivoted near the top of the column and protruding forward and upward forming a tabletop-engaging portion,
- a tabletop overlying the linkage and having an upper surface, a lower surface, a front rim a rear rim, and two side rims joining the front rim to the rear rim,
- pivot means joining the tabletop to the tabletop-engaging portion of the linkage,
- an elongated extensible gas spring piston-cylinder having pivots joining each of its ends respectively to the column and the pivoted linkage, and which is normally clamped in any of its extended positions,
- and at least one manually actuatable unclamping lever mounted on one of the upper or lower tabletop surfaces, along a side rim near the front rim and connected, by a "camera shutter" style cable, to the gas spring piston-cylinder to unclamp it,

whereby manual actuation of the unclamping means and application of manual table lifting or lowering force may be simultaneously performed by the individual user.

2. The counterbalanced table support mechanism defined in Claim 1, wherein the gas spring piston-cylinder is provided with two cylinder chambers separated by the piston having a lockable valve which when locked serves to isolate the two chambers, thereby blocking movement of the piston in the cylinder and preventing raising and lowering of the tabletop, and said valve when unlocked serving to connect the two chambers, thereby permitting raising and lowering of the tabletop, said valve being normally closed, and readily opened by manual actuation by the user of the unclamping lever on the tabletop.

3. The counterbalanced table support mechanism defined in Claim 2, wherein the pivot joining the extensible gas spring piston-cylinder to the pivoted linkage is positioned on said linkage at a point where the force provided by the compressed gas in the piston-cylinder substantially matches the component to be counterbalanced of the weight of the tabletop and its cargo at a mid-range position in said continuous range, while it exceeds said component at lower tabletop levels below said mid-range position and is less than said component at higher tabletop levels above said mid-range position, whereby the tabletop floats to a mid-range level, drifts down to the mid-range level from higher levels, and drifts up to the mid-range level from lower levels.

4. An economical and efficient method for manually adjusting the level of the tabletop in the mechanism defined in claim 2, comprising the steps performed by the individual user of:

Determining a changed new tabletop level  
desired,

Manually gripping the unclamping means, thereby opening  
the valve between the two chambers of the gas

spring cylinder, permitting the piston separating the two chambers to move to a different position, simultaneously applying lightweight vertical force manually to move the tabletop to the desired new level, and then releasing the unclamping means, whereby the released unclamping means closes the valve in the gas spring, clamping the tabletop at the desired new level selected by the user.

5. The mechanism defined in Claim 1 wherein said linkage comprises:

- a cantilever arm, having
  - a rear pivot connecting the arm to the top of the upstanding column,
  - a front pivot connecting the arm to the underside of the tabletop,
  - and an anchor point pivotally joining the arm to the uppermost end of the gas spring piston-cylinder,
- a forward link having a front end and a rear end,
- an upper link having an upper end and a lower end,
- and a bell crank having
  - a central pivot joining it to the cantilever arm,
  - a lower pivot joining it to a front end of the forward link, whose rear end is pivoted to said column,
  - and a rear pivot joining it to the lower end of the upper link, whose upper end is pivotally joined to the underside of the tabletop.

6. The mechanism defined in claim 5, wherein the cantilever arm is formed as a V-shaped cantilever arm.

7. The mechanism defined in claim 5, wherein the cantilever arm is formed as a U-shaped cantilever arm.

8. The mechanism defined in claim 5, wherein the anchor point joining the gas spring's uppermost end is positioned on the cantilever arm at a point between its rear pivot and the central pivot joining the bell crank to the cantilever arm.

9. The mechanism defined in claim 5 wherein the two end pivots of the upper link form a first parallelogram with the bell crank's central pivot and the front pivot of the cantilever arm.

10. The mechanism defined in claim 5 wherein the two end pivots of the forward link form a second parallelogram with the rear pivot of the cantilever arm and the central pivot of the bell crank.

11. The mechanism defined in claim 9, wherein the ends of the upper side of the first parallelogram, delimited by the upper end pivot of the upper link and the cantilever arm's front pivot are respectively adjustable to skew the first parallelogram, whereby the tabletop may be shifted out of a horizontal orientation if desired by the user.

12. The mechanism defined in claim 5 wherein, during raising and lowering travel of the tabletop through its continuous range of different height levels,  
the rear rim of the tabletop,  
and the pivot point joining the underside of the  
tabletop to the upper end of the upper link,

both move along circular arcuate paths having equal radii of curvature about respective virtual center points positioned behind all parts of the mechanism by substantial distances,

whereby the mechanism itself occupies a minimum volume and achieves a compact minimum form factor.

13. The mechanism defined in claim 8 wherein the components of the linkage defining the first parallelogram are dimensioned to make the first parallelogram substantially rectangular for a mid-range level of the tabletop, whereby the acute angles at the apices of the first parallelogram are no smaller than  $45^\circ$  at the lowermost level and at the uppermost level of the tabletop, thus avoiding flattening of the first parallelogram and assuring effective force transmission by the linkage throughout the continuous range of tabletop height levels.

14. The counterbalanced table support mechanism defined in claim 1, wherein each manually actuatable unclamping lever is mounted under the side rim of the tabletop, near its front rim, where it is conveniently presented for gripping by the human user.

15. A compact pivoted and counterbalanced table support mechanism providing the user with readily changeable and automatically clamped tabletop heights while maintaining the tabletop level, and counterbalancing the weight of the table and its cargo at a mid range level, while minimizing force applied by the user, when height levels are unclamped, to raise or lower the tabletop through a continuous range of different height levels, comprising:

a linkage supported by an underlying floor,  
a tabletop overlying the linkage and having an

upper surface, an underside surface, a front rim, a rear rim, and two side rims,  
a pair of downslanting legs each having an upper end pivotally anchored on a first transverse axis to the tabletop's underside near its front edge, and each having a lower end pivotally supporting a wheel rotatable on a second transverse axis,  
a pair of upslanting legs each having a lower end pivotally anchored to a floor-supported bracket on a third transverse axis directly below said first transverse axis, and each having an upper end pivotally supporting a roller supporting said underside surface of said table rotatable on a fourth transverse axis directly above said second transverse axis,  
one downslanting leg of each pair being adjacent to an upslanting leg, the mid-points of both adjacent legs being pivotally joined on a fifth transverse axis,  
the rollers being positioned and connected for ganged rolling motion toward and away from the tabletop's rear rim,  
a link having a rear end connected to said ganged rollers and having a front end,  
a bell crank having an inner end, an outer end, and a central pivot point pivotally connected to the underside of the tabletop, the inner end also being pivotally connected to the front end of said link, and the outer end having a pivot point thereon,  
an extensible gas spring piston-cylinder having pivots joining each of its ends respectively to a fixed point and to the outer end of said

bell crank and which is normally clamped to block telescoping movement of the piston in the cylinder in any of its extended positions,

and manually actuatable unclamping lever means mounted on one of the upper or lower tabletop surfaces, and connected, by a "camera shutter" style cable, to the gas spring piston-cylinder to unclamp it,

whereby manual actuation of the unclamping lever means and application of manual table lifting or lowering force may be simultaneously performed by the individual user.

16. The compact table support mechanism defined in claim 15, wherein the gas spring piston-cylinder is provided with two cylinder chambers separated by the piston having a lockable valve which when locked serves to isolate the two chambers, thereby blocking movement of the piston in the cylinder and preventing raising and lowering of the tabletop, and said valve when unlocked serving to connect the two chambers, thereby permitting raising and lowering of the tabletop, said valve being normally closed, and readily opened by manual actuation by the user of the unclamping lever means on the tabletop.

17. The compact table support mechanism defined in claim 15, wherein the gas spring piston-cylinder is positioned substantially horizontally near the underside surface of the tabletop, and wherein said fixed point is a point on the underside surface of the tabletop.

18. The compact table support mechanism defined in claim 15, wherein said bell crank is dimensioned with unequal ends, the outer end being shorter than the inner end, whereby the central pivot point is closer to the outer end pivot point and farther away from the inner end pivot point.

19. The compact table support mechanism defined in claim 15, wherein the central pivot point and the inner and outer end pivot points of the bell crank and the fixed point are all adapted to be repositioned, whereby the mechanical advantage may be selectively altered to change the relationship of the linearly decreasing gas spring force, produced by telescoping extension of the piston, to the changing component of tabletop weight at different level positions as affected by gravity.

20. A compact pivoted and counterbalanced table support mechanism providing the user with readily changeable and automatically clamped tabletop heights while maintaining the tabletop level, and counterbalancing the weight of the table and its cargo at a mid range level, while minimizing force applied by the user, when height levels are unclamped, to raise or lower the tabletop through a continuous range of different height levels, comprising:

- a linkage supported by an underlying floor having pivoted components and protruding upward forming a tabletop-engaging portion,
- a tabletop overlying the linkage and having an upper surface, a lower surface, a front rim, a rear rim, and two side rims joining the front rim to the rear rim,
- pivot means joining the tabletop to the tabletop-engaging portion of the linkage,
- an elongated extensible gas spring piston-cylinder having two ends, with pivots joining one of its ends respectively to a fixed point and the other end to the pivoted linkage, and which is normally clamped in any of its extended positions,



and at least one manually actuatable unclamping lever mounted on one of the upper or lower tabletop surfaces, and connected, by a "camera shutter" style cable, to the gas spring piston-cylinder to unclamp it, whereby manual actuation of the unclamping lever and application of manual table lifting or lowering force may be simultaneously performed by the individual user.

21. A compact pivoted and counterbalanced table support-elevator mechanism providing the user with readily changeable tabletop heights while maintaining the tabletop level, and counterbalancing the weight of the table and its cargo at a topmost level, while minimizing level changing speed when height levels are changing, to raise or lower the tabletop through a continuous range of different height levels, comprising:

- a base,
- an elongated column upstanding from the rear of the base,
- a linkage pivoted near the top of the column and protruding forward and upward forming a tabletop-engaging portion,
- a tabletop overlying the linkage and having an upper surface,
- pivot means joining the tabletop to the tabletop-engaging portion of the linkage,
- an elongated extensible gas spring piston-cylinder having pivots joining each of its ends respectively to the column and the pivoted linkage, and which has no clamping or locking capability in any of its extended positions,

whereby the tabletop without cargo automatically rises, responding to the counterbalancing force supplied by the gas

spring piston-cylinder to a high loading level, for receiving a predetermined cargo whose extra weight exceeds the counterbalancing force, causing the tabletop to descend to an unloading level, and after unloading the tabletop automatically repeats the cycle.